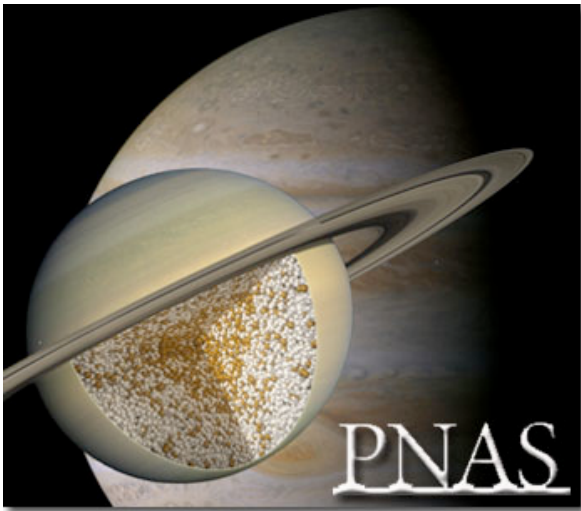


LAWRENCE LIVERMORE REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: Jan. 26-Feb. 2, 2009.

Helium rains in Jovian planets



First-principle simulations have been used to directly determine the miscibility of helium (gold balls) in dense metallic hydrogen (white balls) under the extreme conditions that are present in the interiors of the Jovian planets.

Models of how Saturn and Jupiter formed may soon take on a different look.

By determining the properties of hydrogen-helium mixtures at the millions of atmospheres of pressure present in the interior of Saturn and Jupiter, physicists at Lawrence Livermore National Laboratory and the University of Illinois at Urbana-Champaign have determined the temperature at a given pressure when helium becomes insoluble in dense metallic hydrogen. The results are directly relevant to models of the interior structure and evolution of Jovian planets.

Hydrogen and helium are the two lightest and most common elements in the universe. Because of their ubiquitous nature, they are critical in cosmological nucleosynthesis and are essential elements of stars and giant planets. Hydrogen by itself in the observable universe provides clues to the origin and large-scale structures of galaxies.

The new findings appear in the Jan. 26 online edition of the journal, *Proceedings of the National Academy of Science*.

<http://www.pnas.org/content/early/2009/01/26/0812581106.full.pdf+html>

NIF flickers into *Nature*



A NIF worker adjusts part of the final optics system.

The Lab's National Ignition Facility (NIF) is almost ready to fire up its 192 laser beams to recreate the sun's fusion burn.

The last of the project's 6,206 optics units -- the mostly glass and crystal components that focus the lasers onto a tiny target -- was installed last week. It marked the end of the facility's construction ahead of a federal deadline of March 31.

On hitting the target, the shots create temperatures of more than 100 million degrees and pressures that are thousands of times greater than at Earth's core, which scientists hope will trigger nuclear fusion.

It will be the world's largest laser.

To read the *Nature* story, go to the Web.

https://newsline.llnl.gov/_rev02/articles/2009/jan/nif_nature.pdf

LLNS gives to the community



Laboratory and LLNS management recently met with officials from the San Ramon Valley Unified School District, Dublin Unified School District, Livermore Valley Joint Unified School District, Pleasanton Unified School District and Chabot-Las Positas Community College.

The San Ramon Valley, Livermore, Pleasanton and Dublin school districts and Las Positas Community College Foundation each received a \$5,000 gift from Lawrence Livermore National Security LLC, which manages the Laboratory.

"Both LLNS and the Laboratory are committed to supporting science and mathematics education in the community," said George Miller, lab director and president of LLNS. These gifts are a direct investment in the science and engineering of tomorrow."

The money comes from the LLNS Corporate Giving Program. The gift program donations come from the fee LLNS receives to manage the Lab.

Lab donates water treatment units to UCSC



Robin Newmark of the Lab's Global Security Directorate inspects the water units.

Two water treatment units that have been stored at the Lab's main site were loaded up last week for a short trek to a new home -- the University of California, Santa Cruz (UCSC), Center for Integrated Water Research.

The reverse osmosis water treatment units will play an important role in the center's Water Teaching and Research Laboratory, or WaterLab, a joint venture of UCSC, the Monterey Regional Water Pollution Control Agency and the Marina Coast Water District in Monterey.

The movable units were originally obtained by the Lab several years ago from government excess to support some of LLNL's water treatment studies. However, due to a shift in research priorities, the equipment was never utilized.

Robin Newmark, deputy program leader in Energy and Environmental Security in the Global Security Principal Directorate, has shepherded the relocation efforts over the past few months.

"Safe and reliable fresh water is critical to human life," Newmark said. "The water industry faces many challenges and is looking to higher education to help solve those problems."

Latest *Newsline* available

NEWSLINE

Newsline provides the latest Lab research and operations news. See the most recent issue at https://newsline.llnl.gov/_rev02/index.php

Photo of the week



I spy: A National Ignition Facility worker inspects the Wedge Focus Lens, a fused-silica lens in the final optics assembly that focuses and steers the ultraviolet light to the target in the center of the target chamber. It also serves the important function of dispersing unconverted infrared and green light away from the target. The official NIF dedication is scheduled for May.

LLNL is managed by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy's National Nuclear Security Administration.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the Livermore Lab Report, send e-mail
<mailto:labreport@llnl.gov>.

The Livermore Lab Report archive is available at:
https://publicaffairs.llnl.gov/news/lab_report/2009index.html